

WRITTEN REPLY

Examiner of the Patent Office: Mr. YOSHIZAWA, Eiichi

1. Indication of International Application:

PCT/JP03/13497

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4. Date of the Notification: September 14, 2004

5. Contents of the Reply:

(1) Contents of the Written Opinion:

According to the Written Opinion dated September 14, 2004, the Examiner judged the invention of this application as follows.

1) Claims 1, 6 and 8 thru 10:

The inventions claimed in claims 1, 6 and 8 thru 10 do not involve in inventive steps over Document 1.

2) Claims 1 and 3 thru 12:

The inventions claimed in claims 1 and 3 thru 12 are ambiguous and defective as an international application.

Document 1: JP 2-209934 A (Mitsubishi Kasei Corporation and Nippon Kasei Chemical Co., Ltd.), August 21, 1990

(2) Amendment of the Claims of this Application:

We have lodged a Written Amendment under the provision of Section 11 of the Law to the Commissioner of the Japan Patent Office on the same date of this Written Reply so as to amend the description of the claim 1 of this application in the following manner.

Claim 1 before the amendment:

A resin molded article for electric part, which is characterized by one resulting from molding and solidifying a resin composition containing a thermoplastic polymer, a crosslinking agent comprising a polyfunctional monomer or oligomer containing an unsaturated group in ends of the major skeleton, an inorganic filler, and a reinforcing fiber and then crosslinking said thermoplastic polymer by heating or radiations.

Claim 1 after the amendment:

A resin molded article for electric part, which is characterized by one resulting from molding and solidifying

a resin composition containing a thermoplastic polymer, a crosslinking agent comprising a polyfunctional monomer or oligomer containing an unsaturated group in ends of the major skeleton, an inorganic filler, and a reinforcing fiber and then crosslinking said thermoplastic polymer by heating or radiations and containing at least said trifunctional crosslinking agent as said crosslinking agent, with the content of said crosslinking agent being from 0.5 to 10 parts by weight based on 100 parts by weight of said thermoplastic polymer.

(3) Gist of the Invention of this Application:

From the descriptions of the claims of the aforesaid Written Amendment, the gist of the invention of this application is as follows.

1. A resin molded article for electric part, which is characterized by one resulting from molding and solidifying a resin composition containing a thermoplastic polymer, a crosslinking agent comprising a polyfunctional monomer or oligomer containing an unsaturated group in ends of the major skeleton, an inorganic filler, and a reinforcing fiber and then crosslinking said thermoplastic polymer by heating or radiations and containing at least said trifunctional crosslinking agent as said crosslinking agent, with the

content of said crosslinking agent being from 0.5 to 10 parts by weight based on 100 parts by weight of said thermoplastic polymer.

2. (Cancelled)

3. The resin molded article for electric part according to claim 1 or 2, wherein two or more kinds of said polyfunctional crosslinking agent are used in combination as said crosslinking agent.

4. The resin molded article for electric part according to any one of claims 1 to 3, wherein said thermoplastic polymer is a polyamide based resin, and the major skeleton of said crosslinking agent is an N element-containing cyclic compound.

5. The resin molded article for electric part according to any one of claims 1 to 4, wherein said crosslinking agent is a compound represented by the following general formula (I).
(The structure formula is omitted.)

6. (Cancelled)

7. The resin molded article for electric part according to any one of claims 1 to 6, wherein said reinforcing fiber is contained in an amount of from 5 to 40 % by weight based the whole of said resin composition, and said reinforcing fiber is a glass fiber the surface of which has been treated with a resin.

8. The resin molded article for electric part according to

any one of claims 1 to 7, wherein said inorganic filler is contained in an amount of from 1 to 15 % by weight based on the whole of said resin composition.

9. The resin molded article for electric part according to claim 8, wherein stratiform clay having a silicate layer laminated therein is contained as said inorganic filler, and said stratiform clay is contained in an amount of from 1 to 10 % by weight based on the whole of said resin composition.

10. The resin molded article for electric part according to any one of claims 1 to 9, wherein said resin composition contains a flame retarder, and said flame retarder is contained in an amount of from 2 to 35 % by weight based on the whole of said resin composition.

11. The resin molded article for electric part according to claim 10, wherein a monofunctional organophosphorus compound containing one unsaturated group in the end thereof is contained as said flame retarder.

12. The resin molded article for electric part according to any one of claims 1 to 11, wherein said electric part is used for an electromagnetic switch.

13. A production process of a resin molded article for electric part, which is characterized by including an adsorbing step for adsorbing a crosslinking agent comprising a polyfunctional monomer or oligomer containing an unsaturated group in ends of the major skeleton onto an

inorganic filler; a kneading step for kneading a resin composition containing the inorganic filler after the adsorption, a thermoplastic polymer, and a reinforcing fiber; a step for injecting molding said kneaded resin composition; and a crosslinking step for taking out said resin composition after the injection step from a mold and heating it or irradiating it with radiations.

14. The production process of a resin molded article for electric part according to claim 13, wherein electron beams or γ -rays having a dosage of 10 kGy or more are irradiated for the irradiation with radiations in said crosslinking step.

15. The production process of a resin molded article for electric part according to claim 13, wherein the heating is performed at a temperature of at least 5 °C higher than the temperature of said injection molding for the heating in said crosslinking step.

16. The production process of a resin molded article for electric part according to any one of claims 13 to 15, wherein at least said trifunctional crosslinking agent is contained as said crosslinking agent.

17. The production process of a resin molded article for electric part according to any one of claims 13 or 16, wherein two or more kinds of said polyfunctional crosslinking agent are used in combination as said crosslinking agent.

18. The production process of a resin molded article for

electric part according to any one of claims 13 to 17, wherein said thermoplastic polymer is a polyamide based resin, and the major skeleton of said crosslinking agent is an N element-containing cyclic compound.

19. The production process of a resin molded article for electric part according to any one of claims 13 to 18, wherein said crosslinking agent is a compound represented by the following general formula (I). (The structural formula is omitted).

20. The production process of a resin molded article for electric part according to any one of claims 13 to 19, wherein said crosslinking agent is contained in an amount of from 0.5 to 10 parts by weight based on 100 parts by weight of said thermoplastic polymer.

21. The production process of a resin molded article for electric part according to any one of claims 13 to 20, wherein said reinforcing fiber is contained in an amount of from 5 to 40 % by weight based the whole of said resin composition, and said reinforcing fiber is a glass fiber the surface of which has been treated with a resin.

22. The production process of a resin molded article for electric part according to any one of claims 13 to 21, wherein said inorganic filler is contained in an amount of from 1 to 15 % by weight based on the whole of said resin composition.

23. The production process of a resin molded article for

electric part according to claim 22, wherein stratiform clay having a silicate layer laminated therein is contained as said inorganic filler, and said stratiform clay is contained in an amount of from 1 to 10 % by weight based on the whole of said resin composition.

24. The production process of a resin molded article for electric part according to any one of claims 13 to 23, wherein said resin composition contains a flame retarder, and said flame retarder is contained in an amount of from 2 to 35 % by weight based on the whole of said resin composition.

25. The production process of a resin molded article for electric part according to claim 24, wherein a monofunctional organophosphorus compound containing one unsaturated group in the end thereof is contained as said flame retarder.

26. The production process of a resin molded article for electric part according to any one of claims 13 to 25, wherein said electric part is used for an electromagnetic switch.

The gist of the aforesaid amendment resides in the matter that the constituent features "at least said trifunctional crosslinking agent is contained as said crosslinking agent" as recited in claim 2 before the amendment and the constituent features "said crosslinking agent is contained in an amount of from 0.5 to 10 parts by weight based on 100 parts by weight of said thermoplastic polymer" as

recited in claim 6 before the amendment have been incorporated into claim 1 before the amendment. Also, following this, claims 2 and 6 before the amendment have been cancelled.

According to the present invention, it is possible to provide a resin molded article having excellent heat resistance, mechanical characteristics, electric characteristics, dimensional stability, flame retardancy, and molding properties and capable of being subjected to usual injection molding. And the resin molded article of the present invention can be suitably used as, for example, a member for supporting a contact of electromagnetic switch and a housing.

(4) Comparison of the citation with the invention of this application (regarding the reason for refusal against claims 1, 6 and 8 thru 10 over Document 1):

Claim 1 of Document 1 discloses:

"A production process of a flame retardant crosslinked polybutylene terephthalate resin molded article, which comprises molding a polybutylene terephthalate resin having blended therewith a flame retarder, a filler and diallyl isocyanurate as a crosslinking agent and crosslinking the molded article upon irradiation with radiations."

The crosslinking agent to be used in Document 1 is a bifunctional (diallyl isocyanurate) crosslinking agent, whereas in the invention of this application, it is described

that a trifunctional crosslinking agent is preferable as the crosslinking agent.

Accordingly, not only the invention directed to claim 1 after the amendment in which the constituent features of claim 2 before the amendment have been limited in claim 1 before the amendment is different from the invention described in Document 1, but also by using the trifunctional crosslinking agent as the crosslinking agent, a uniform three-dimensional network structure can be formed in the resin molded article, thereby bringing effects which could not have been made on the basis of Document 1 such that a resin molded article having more excellent heat resistance and mechanical strength is obtained (see page 5, lines 1 to 3 of the description (corresponding to page 10, lines 10 to 15 of the translation) before the amendment).

Also, according to the Written Opinion dated September 14, 2004, it was admitted that the invention claimed in claim 2 before the amendment involves in an inventive step.

Accordingly, it is respectfully submitted that the invention directed to claim 1 after the amendment is not one which could have easily been made by those skilled in the art on the basis of the invention described in Document 1 and should involve in an inventive step.

(5) Regarding the Examiner's pointing out against the issue

of deficiency of international application (regarding the reason for refusal against the opinion that the inventions claimed in claims 1 and 3 thru 12 are ambiguous):

The Examiner found that so far as the resin molded articles of Comparative Examples 2 and 3 in the description are included in the inventions claimed in claims 1 and 3 thru 12, the inventions claimed in claims 1 and 3 thru 12 are ambiguous because the range where the effects of the invention of this application are not brought is explicitly included therein.

In response to this, we have limited claim 1 before the amendment by incorporating the requirement of claim 6 before the amendment thereinto.

In the resin molded articles of Comparative Examples 2 and 3, the content of the plasticizer is 19.55 parts by weight based on 100 parts by weight of the aforesaid thermoplastic polymer, and it has become clear that the resin molded articles of Comparative Examples 2 and 3 in which the blending amount of the crosslinking agent falls outside the blending amount of the invention of this application do not bring the effects of the invention of this application, thereby making the invention clear.

(6) Conclusion:

In the light of the above, we consider that all of the

inventions claimed in claims 1 thru 26 of this application are not defective as an international application and should involve inventive steps. Accordingly, we respectfully request the Examiner to make the aforesaid opinions by reference in preparing an international preliminary examination report.